Cancer diagnosis affects cognitive function

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Breast cancer patients often display mild cognitive defects even before the initiation of chemotherapy. A new study by LMU researchers now attributes the syndrome to post-traumatic stress induced by diagnosis of the disease.

A large number of studies have shown that cancer patients very often exhibit mild deficits of attention, memory and other basic cognitive functions. The phenomenon has generally been attributed to putative side-effects of chemotherapeutic drugs on the brain, and the condition is therefore popularly referred to as chemobrain. – However, more recent investigations have detected symptoms of chemobrain in patients who had not yet embarked on a course of chemotherapy. Now a research team led by LMU’s Dr. Kerstin Hermelink at the Breast Center in the Department of Gynecology and Obstetrics at Munich University Hospital has shown that, in breast cancer patients, pretreatment cognitive impairment is most probably due to posttraumatic stress induced by diagnosis of the malignancy itself. The group’s findings have just appeared in the “Journal of the National Cancer Institute”.

Much of the published evidence for the appearance of pretreatment perturbations of cognitive function has come from studies on breast cancer patients, and several hypotheses have been advanced to account for these findings. For example, it has been proposed that malignant disease might itself disrupt certain brain functions by activating the secretion of cytokines that modulate the immune system. An alternative suggestion is based on the idea that cancer and cognitive impairment might have a common genetic basis. The latest data come from a multicenter study called Cognicares (Cognition in Breast Cancer Patients – the Impact of Cancer-related Stress), in which the LMU researchers have tested a quite different theory, for which their findings now provide strong support.

Diagnosis-associated trauma

“Cancer patients can perceive and experience their condition as a severe trauma. Indeed, many of them develop symptoms of post-traumatic stress disorder, particularly in the early phase after they receive the diagnosis,” says Kerstin Hermelink. “Stress has a very considerable influence on cognitive performance and definitely impacts on brain function – so it was quite natural for us to ask whether the
cognitive deficiencies displayed by many breast cancer patients might not be attributable to the stress that is inevitably associated with malignant disease.”

Hermelink and her colleagues studied 166 women who had been diagnosed with breast cancer and 60 others in whom screening of the breast had revealed no signs of disease. The participants were assessed at three times during the first year following the diagnosis. Prior to the first course of treatment, the patients and the healthy controls exhibited very similar levels of performance on standard cognitive tests. However, in one specific test of attention, members of the patient group had a significantly higher error rate. “And as we suspected at the outset, the higher failure rate in this test could be linked to post-traumatic stress – the greater the level of stress, the more errors they made, and statistical analysis confirmed that the correlation was highly significant,” as Kerstin Hermelink explains.

**Some good news too**

Interestingly, the extent of pretreatment cognitive impairment detected in the Cognicares study was considerably lower than that reported in several earlier investigations. “This is probably because we took great pains to control effectively for the possible impact of factors that could have distorted the interpretation of the results,” says Hermelink. "In particular, we made sure that differences in the composition of the two groups were minimized as far as possible." This is important because even slight differences in age structure, level of education or intelligence between the patients and the control group can result in discrepancies in cognitive performance on standardized tests, which could mask – or amplify – the extent of cognitive impairment displayed by the patients.

“For breast cancer patients our findings are good news,” says Kerstin Hermelink. “At all events – in pretreatment phase at least – they give no grounds for the belief that such patients suffer from more than minimal cognitive deficiencies, which are induced by the stress associated with the disease itself.”

The Cognicares study is one of the most extensive investigations of its kind yet carried out anywhere in the world. Six breast cancer centers located in and around Munich participated in the project, which was made possible by a grant from the Deutsche Krebshilfe (the German Cancer Aid). The results of the tests undertaken after the termination of primary treatment are now being analyzed. *(Journal of the National Cancer Institute)*